

# THE POTENCY OF DAIRY CATTLE AGRIBUSINESS DEVELOPMENT IN SEMARANG REGENCY, CENTRAL JAVA

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## ABSTRACT

The study aimed to analyze the potency of dairy cattle agribusiness development in Semarang Regency and the factors influencing the potency of dairy cattle agribusiness development. The study was conducted from September to December 2008 in Semarang Regency, Central Java, using survey method. Three districts were purposively chosen based on the largest population of dairy cattle in the Semarang Regency. Of the three districts selected, six villages were chosen based on the largest population of dairy cattle. The respondents were chosen randomly using simple random, hence the sample size in this study was 90. Data were gathered through primary and secondary data. The data were analyzed descriptively and statistically. The analysis of LQ (Location Quotient) was used to analyze the potency of dairy cattle agribusiness development, while the multiple regression model was used to determine the factors affecting the potency of dairy cattle agribusiness development, with the following regression equation:  $Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + e$ , whereas  $Y$  is the production of milk, and  $x_1$  to  $x_7$ , respectively, are  $x_1$  (age),  $x_2$  (education),  $x_3$  (Number of family members),  $x_4$  (number of lactating cows),  $x_5$  (amount of feed, forage),  $x_6$  (amount of feed concentrate) and  $x_7$  (calving interval). The results showed that the potency of dairy cattle agribusiness development in Semarang Regency is potential ( $LQ > 1$ ) with the value of 4.67 and  $LQ \text{ Population GDP} = 1.71$ . This study indicated that socio, economic and demographic resources are important factors that can help develop and improve dairy cattle farming. Meanwhile, there were significant relationships between 7 independent factors and the potency of dairy cattle agribusiness development, with the following regression equation:  $Y = -6.082 + 0.032 x_1 + 0.223 x_2 + 0.717 x_3 + 9.221 x_4 + 0.067 x_5 + 0.486 x_6 - 0.323 x_7 + e$ . Moreover, the value of  $R^2 = 0.886$ , it is indicated that 88.6% of the variation in the dependent variable can be explained by the independent variable, only 11.40% can be explained by other variables.

*Keywords : Potential Development, agribussines dairy cattle*

## INTRODUCTION

Dairy cattle farming is an activity to produce milk and play vital roles in providing national food security, nutrition, income, and savings. The total Indonesian milk consumption was estimated to increase due to the population growth, economic improvement and community awareness of the importance of nutritious food, especially from dairy products. It is a good opportunity for dairy cattle development. In addition, dairy cattle farming play important role for the life of farmers in terms of family economic resources, industrial raw material suppliers, providing jobs, and the environment by using organic fertilizer.

The management condition of small dairy

farm in Semarang Regency is more or less traditional. The main objective of dairy development in Semarang Regency is to increase the production and availability of milk through integrated policy of cattle dairy development, eliminating the middlemen, through the formation of cooperatives and self-supporting dairy enterprises. In addition, the implementation of dairy cattle agribusiness systems can be used to increase production and productivity of dairy cattle farming.

Some important dairy cattle agribusiness system are: 1) upstream agribussines system. It is organized on a decentralized basis in the dairy cattle farming activities; 2) onfarm agribussines system. It is production activities; 3) downstream agribusiness subsystem. These system include

milk processing and marketing and 4) subsystem support (supporting agribusinesses). Some of these systems, for instance, subsidy on animal feed, cultivation of fodder, providing milk marketing facilities and financial support, expansion of veterinary service, giving management training of farm owners. According to Saragih (2001), the development of animal husbandry with agribusiness approach can be realized if the dairy cattle farming is able to compete in global market. The Indonesian fresh milk production remains stagnant at 1.2 million liters per day and meets only about 30 percent of Indonesian demand for milk. The gap is fulfilled from imports. In addition, the dairy cattle farming in Semarang Regency is characterized by inefficient small-scale farms and poor farming practices which continue to hinder further improvement in Indonesian milk production and quality. This situation is an opportunity in order to develop better dairy cattle farming. Hence, the Indonesian milk processing industry is expected to continue growing.

The Semarang Regency's dairy cattle production faces a number of fundamental problems which include limited farmer education, scarcity of forage, small farm size, scarcity of land with suitable elevation for dairy cattle farming, limited access to bank loans, lack of technology for milking and fresh milk processing, and limited access to high-quality genetics. Based on this situation, all stakeholders in dairy cattle farming must act together to be able to maximize resources and efforts in bringing about the necessary changes in order to improve the quality of live.

Dairy cattle is considered an important livestock in Central Java province. Semarang Regency is the second largest milk producer in this province with a production of 89,916,259 liters and with a population of 34,067 heads in 2008 (Dinas Peternakan dan Kesehatan Ternak Propinsi Jawa Tengah, 2009). In order to improve competitiveness, it is important that there be some general consensus as to what the problem areas are for the industry. In this way, the government and the industry will be able to formulate programs that will be in the best long term interest of the industry. All stakeholders must act together to be able to maximize resources particularly livestock, feeds, land, human resources and technological resources. Based on the description above mention, it is necessary to study the factors influencing the potency of dairy cattle

agribusiness development in Semarang regency. The results of this research would like to provide comprehensive information about the potency of dairy cattle agribusiness development in Semarang regency and the factors affecting milk production.

## MATERIALS AND METHODS

The study was conducted from September to December 2008 in Semarang Regency, Central Java. The study was conducted using survey method. According to Singarimbun and Effendi (1995), survey method is a detailed study or inspection, as by gathering information through observations, questionnaires, etc. and analyzing it. Three districts (Getasan District, Tuntang District and Tenganan District) were purposively chosen because it has the largest population of dairy cattle in the Semarang Regency. Moreover, of the 3 districts in the Semarang Regency, 6 villages were chosen since it has the largest population of dairy cattle. The respondents (15 farmers of each village) were chosen randomly using simple random, hence the sample size in this study was 90. Data were gathered through primary and secondary data. Primary data were collected mainly through a survey questionnaire by interviewing the dairy cattle farmers with the help of enumerators. Secondary data were collected from relevant agencies such as Department of Animal Husbandry and Fisheries Semarang Regency and the Central Statistics Agency (BPS) of Central Java Province.

### Methods Data Processing and Analysis

The data were analyzed descriptively and statistically. LQ ("Location Quotient") test was used to analyze the potency of dairy cattle agribusiness development. According to Arsyad (1999), LQ ("Location Quotient") test was determined based on indicators such as the development potential of livestock population and Gross Domestic Product (GDP).

$$LQ (\text{Population} / \text{GDP}) = \frac{\sum PSKb : \sum PSJT}{\sum PTkb : \sum PTJT}$$

Description:

$\sum PSKb$  = Total population of dairy cattle in Semarang District

$\sum PSJT$  = Total population of dairy cattle in Central Java

$\Sigma$  PTKb = Total cattle population in Semarang District.

$\Sigma$  PTJT = Total cattle population in Central Java

LQ criteria:

- If  $LQ > 1$  = sector base / potential
- If  $LQ = 1$  = balanced / adequate potential
- If  $LQ < 1$  = non base / less potential

Linear regression model was used to determine the factors influencing the potency of dairy cattle agribusiness development in Semarang regency. The model was determined based on the following formula (Gujarati, 1997; Ghozali, 2005):

$Y: a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + e$ , where:

$Y$  = milk production (lt/day)

$a$  = Constant

$b$  = regression coefficient

$x_1$  = age of farmer (years)

$x_2$  = education of farmers (years)

$x_3$  = JART (person)

$x_4$  = number of lactating cows (heads)

$x_5$  = feeding forage (kg / day)

$x_6$  = concentrate feeding (kg / day)

$X_7$  = calving interval (months)

$e$  = Deviation Stochastic

F test and t-test was used to examine the factors influencing the potency of dairy cattle agribusiness development in Semarang regency using 5% level of significance.

## RESULTS AND DISCUSSION

### Overview of Study Sites

Semarang Regency is one of 35 regencies in Central Java. Semarang Regency is a representative of an upland area and it has a total area of 95.020,674 ha. The agricultural land (riceland) covers about 24.417,9392 ha (25.7%) while the forest land comprises about 70.602,734 ha (74.3%). The average temperature per year is 26.2°C. The average rainfall per year is 1.800 – 2.000 mm. According to Sudono *et al.* (2003), this climate is highly favorable to grow many agricultural crops and forest products. It is also favorable for raising livestock, such as cattle and goats. One of the advantages of dairy cattle management at the farmer's level is that they use locally available cattle feed resources. Family members are involved in feeds processing and daily feeding of cattle. In Semarang regency, the

value of carrying capacity is 1,495,216 Animal Unit (AU) and the total population of cattle is 200,142.48 AU (Dinas Peternakan dan Kesehatan Hewan Propinsi Jawa Tengah, 2010).

Semarang Regency had a population of 906.112 in 2007. In terms of gender, 49.06 percent (449.740) of the total population were males while 50.94 percent (456.372) were females. In 2007, the sex ratio in Semarang Regency was 98.55 and the population density is 954/Km. Most of the population were farmers. More than half (51%) of them derived income from raising animals. Hence, cattle play important role to generating income in order to improve farmers' welfare. Table 1 shows the total livestock population in Semarang Regency in 2009.

Table 1 shows that dairy cattle is the second highest population. This condition indicates that dairy cattle is not only an important source of food but it also provides employment and income to the farmers in the country. Semarang Regency is the second largest milk producer in this province. Dairy cattle farmers sell their product through KUD (Koperasi Unit Desa). KUD providing milk marketing facilities and financial support. Growth prospects in the dairy sector are very bright

The result of the study showed that dairy cattle is a significant commodity that has been supporting the socio-economic status of people in Semarang Regency. In other study areas, a cattle farmer owns only an average of two to three heads. This number of cattle is small, thus, the additional income gained from the dairy cattle does not influence the welfare of the farmer. Bessant (2008) suggested that if each farmer

Table 1. The Livestock Population in Semarang Regency in 2009

No.	Livestock	Population (Animal Unit)	%
1	Beef cattle	50 092.73	25.04
2	Dairy cattle	26 552.80	13.27
3	Buffalo	4 169.52	2.08
4	Horses	1 340.55	0.67
5	Goat	19 360.62	9.67
6	Sheep	17.381.53	8.69
7	Pig	5 734.67	2.87
8	Rabbit	27.46	0.01
9	Poultry	75 442.59	37.7
Total		200 102.47	100

Source: Dinas Peternakan dan Kesehatan Hewan Propinsi Jawa Tengah (2010)

could raise at least more than five heads, he could get additional income. Several factors causing the low performance of dairy cattle farming is: 1) Small farm size, 2) Low price of dairy product, 3) poor farm management practices and 4) limited access to capital.

### Socio-demographic Characteristics of the Respondents

Out of the 90 respondents, 85.55 percent was within the age range of 30-60 years old (85.55%), while 14.45% of the respondents belonged to the age range of above 60 years old. Most of the respondents were in their active stage. In the case of the respondents, 73.34% had formal education: 55.55% attended primary school, while 11.11% attended secondary school. The findings further indicated that 5% of the respondents finished high school, while only 1.11% were able to finish college. A small percentage (26.67%) did not have any formal education. It can be concluded that there was a very low literacy rate among the respondents. Moreover, 55.55% of the respondents had experience to manage a dairy farming for 10-10 years, while 44.45% of the respondent had experience to manage a dairy farming for more than 10 years. The family size of the respondents ranged from a minimum of two to a maximum of 11 members per family. The average family size was 5.42, which was within the national average level of 5.4 members. Nearly half (44.44%) of the respondents had four to six members, 25.5% had one to three members, and 30% had more than six members in the family. In term of farm size, 55.55% of the respondents own one to three heads, while 15.55% had 4-6 heads and 28.89% own more than 6 heads. The condition of farm size is small. So the farmers should increase the farm size in order to improve the quality of life.

### The potency of dairy cattle agribusiness development in Semarang Regency

LQ ("Location Quotient") test was used to analyze the potency of dairy cattle agribusiness development. Results of the study showed that the value of the LQ based on the indicators of dairy cattle population and GDP are 4.67 and 1.71. While the relative population of dairy cattle in the Semarang Regency was more or less dominant on basis sector of Central Java Province ( $LQ > 1$ ). Hence, dairy cattle farming has potency to develop and all the stakeholders should be mobilized to help in maintaining the sustainability

of the dairy development program. The regencies of Boyolali and Semarang is the top ten (10) dairy cattle population in Central Java. The Semarang Regency has a strategic location because it is close to the marketing area of milk products, namely the city of Semarang, Solo, and Yogyakarta (Prasetyo *et al*, 2005).

Table 2 shows the value of LQ. It can be seen that the dairy farming in the Semarang Regency is a basic sector. The dairy farming should strengthen as a source of family income and regional economic development.

Table 2. Potency of Dairy Cattle Agribusiness Development in Semarang Regency

Components	L/Q	Note
Dairy cattle population	4.67	$>1$ , basis sector
PDB	1.71	$>1$ , basis sector

According to Mukson *et al.* (2006), the value of LQ based on GRDP (Gross Regional Domestic Product) from 17 districts in Central Java in 2006 was 1.33. Hence, all stakeholder should be mobilized to help in maintaining the sustainability of the dairy development program. According to Sudono (2003), there were several advantages to develop dairy cattle farming: 1) contributing regular income (milk money), 2) providing national food security and nutrition, 3) savings, 4) producing fertilizer, 5) providing agricultural power, savings, and other social and cultural functions. There were three important things in the concept of sustainable agriculture, namely 1) beneficial to farmers in the long term, 2) avoidance of environmental damage, maintain soil conservation, water and other natural resources and 3) ensure adequate food supply. Based on the livelihood in Semarang regency, the government should improve ways in disseminating knowledge and information about beef cattle management maintaining the sustainability of the dairy development program.

### Analysis of factors affecting the potency of dairy cattle agribusiness development.

The linear regression model was used to analyze the factors affecting the potency of dairy cattle agribusiness development and milk production (dependent variable). The result of F test showed that the independent variables (age, educational level, number of household members, number of lactating cows, feeding the forage,

Table. 3. Factors Affecting the Potency of Dairy Cattle Agribusiness Development

Variable	Coefficient of Regression	Significance
Constant	-6.08	
Age (x1)	0.032 <sup>ns</sup>	0.57
Education (x2)	0.223 <sup>ns</sup>	0.39
JART (x3)	0.72	0.069*
The number of cows Lactation (x4)	9.22	0.00***
Forage (x5)	0.067 <sup>ns</sup>	0.23
Concentrate (x6)	0.49	0.045**
Calving interval (x7)	-0.323 <sup>ns</sup>	0.44
F test	90.83	0.00**
R <sup>2</sup>	0.886	

\*\*\* (P<0.01); \*\* (P<0.05); \* (P<0.1); ns : not significant

concentrate and calving interval) were found to be highly significant associated (P<0.01) with milk production (Table 3). According to Thau (2004), another factors affecting milk production were the level of education, faming experience, the existing of capital and credit, extension agents, and training of farmers. In addition, labour factors also have significant relationship with milk and the value of regression coefficient was 0.717 (every increasing of labour will increase the quantity of milk production). Thau (2004) added that human resources and level of knowledge were important factors to improve dairy cattle farming. The government should improve ways in disseminating knowledge and information about beef cattle management. From the statement above, the farmers should also be provided with improved and better access to financial assistance and availability of the needed farm inputs by the government and the extension agents.

The result of t-test showed that the number of cows lactation was highly significant correlated with milk production (P<0.01). In each increasing the population of lactation cows will increase the milk production of 9.25 liters/head/day. The results of Swastika (2009) showed inefficiency of dairy farming because the farm size of dairy cattle were 2-4 heads. In term of providing concentrate, there was significantly relationship between providing concentrate and milk production (P<0.05). Regression coefficient of providing concentrate was 0.486. In each increasing of concentrate will increase milk production of 0.48 liters/head/day. It is important to consider not only about the quantity and also

the quality of concentrate. The farmers usually use concentrate as a source of feed to enhance the weight gain with an average of 3.22 kg/head/day. Moreover, forage was not significantly related to milk production (P>0.05). Regression coefficient of providing forage was 0.06. In each increasing of forage will increase milk production of 0.06 liters/head/day. The most economical way of producing milk from dairy cattle is to feed them with good quality forages (Sudono *et al.*, 2003).

Calving interval is an interval of cows to produce calves, so it requires a good handling, especially mating systems. Calving intervals is appropriate to maintain the sustainability of milk production. Average calving interval was 14.16 months. The results showed that the regression coefficient is -0.32. In each additional birth will reduce milk production of 0.32 liters/head/day. Calving interval was not significantly related to milk production, and it had negative values. If calving interval increase then it will decrease milk production.

Milk is highly perishable and must be cooled and stored immediately. Most of locally produced milk comes from small farmers raising two to 10 cattle. A few organized commercial dairy farms contribute significantly to milk production. The production of quality milk begins on the farm. Every dairy farmer must produce safe, sanitary, wholesome and palatable milk. Dairy farming must be profitable to sustain farm income.

Table 3 shows the value of  $R^2 = 0.886$ . It is indicate that 88.6% of the variation in the the dependent variable can be explained by the independent variable, while only 11.40% can be

explained by other variables. It is very important to consider the others factors, for instance human factors, livestock ownership, low level of farm efficiency, animal health, feed availability, milk quality, climatic adaptation, relationship between farmers and extension agents, marketing and level of technology.

## CONCLUSION

The value of the LQ based on the indicators of dairy cattle population and GDP were 4.67 and 1.71, while the relative population of dairy cattle in the Semarang Regency was more or less dominant on basis sector of Central Java Province ( $LQ > 1$ ). All independent variables had significant relationship with milk production in which proved by high value of  $R^2$  being 0.886.

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